CLAIMS

1. Electric motor (10), in particular for adjusting moving parts in a motor vehicle, comprising an electronic unit (70) with a sandwich construction, which contains a first electrically conductive substrate (71) and a second electric conductive substrate (72), between which power components (75) are located and electrically connected to both substrates (71, 72), and a side (84) of the second substrate (72) facing away from the first substrate (71) is equipped with additional electronic components (56), wherein the first substrate (71) is embodied as a punched grid (44), which together with the second substrate (72) is extrusion coated with a plastic body (95) in such a way that the extensions (97) of the punched grid (44) protrude from the plastic body (95), forming an electrical and/or mechanical interface (98) for connecting additional motor components (99, 38, 40, 104, 102, 80).

2. Electric motor (10) according to Claim 1, characterized in that the extensions (97) are embodied as fastening elements (100) of the electronic unit (70), in particular as bore holes (100).

3. Electric motor (10) according to Claim 1, characterized in that the extensions (97) are embodied as connector pins (88) or as contact points (101) to external electronic components (74) such as a capacitor (80) or an inductor or a stranded wire (76), and made in particular of material containing copper.

4. Electric motor (10) according to claim 1, characterized in that the motor components (99) are spring clips (40) for accommodating carbon brushes (38).

5. Electric motor (10) according to claim 1, characterized in that the motor components (99) are electro-magnetic shielding bodies (104), which are embodied in particular as one piece with the extensions (97).

6. Electric motor (10) according to claim 1, characterized in that holding elements (91) are formed on the punched grid (44), into which the power components (95) and/or the second substrate (72) can be inserted in order to produce an electrical and/or mechanical connection to the punched grid (44).

7. Electric motor (10) according to Claim 1, characterized in that the contact points (101) are embodied as interfaces (98) using nip-clinch technology.

8. Electric motor (10) according to Claim 1, characterized in that a microprocessor (58) and/or a control logic (58) and a position sensory mechanism (60) for an armature shaft (12) of the electric motor (10) are arranged on the second substrate (72) as electronic components (56).

9. Electric motor (10) according to Claim 1, characterized in that the second substrate (72) has at least one electrically conductive surface (83, 84), and the electronic components (56) can be equipped variably by means of soldering or conductive adhesion, in particular using flip-chip technology.

10. Electric motor (10) according to Claim 1, characterized in that the second substrate (72) has a ceramic plate (81) and at least one conductor track layer (83, 84) on its upper and lower sides, which are connected to one another electrically in particular by means of vias holes.

11. Electric motor (10) according to Claim 1, characterized in that the power components (75) and/or the components (56) are embodied as bare die elements without a housing.

12. Electric motor (10) according to Claim 1, characterized in that the power components (75) have a solderable or conductively adhesive surface (85, 86) on both sides, which is provided with solder bumps (90) in particular for soldering technology on the side (86) facing the second substrate (72).

13. Electric motor (10) according to Claim 1, characterized in that the power components (75) are embodied as power MOSFETs (79).

14. Electric motor (10) according to Claim 1, characterized in that the power components (75) are arranged symmetrically for better heat dissipation on the first substrate (71).

15. Electric motor (10) according to Claim 1, characterized in that the two substrates (71, 72) are embodied as heat sinks, wherein in particular at least one extension (97) of the punched grid (44) is embodied as a cooling surface (96) outside the plastic body (95).

16. Electric motor (10) according to Claim 1, characterized in that the plastic body (95) is formed on by means of a transfer molding process, wherein in particular epoxy molding compound flows into a gap (113) between the two substrates (71, 72).

17. Electric motor (10) according to Claim 1, characterized in that the plastic body (95) is extrusion coated with another plastic of a housing part (14) and/or of a connector collar (111).

18. Electric motor (10) according to Claim 1, characterized in that the plastic body (95) is arranged on a separate module support, and fixed in particular by means of a clip connection.

19. Electric motor (10) according to Claim 1, characterized in that the electronic unit (70) can be mounted radially to the armature shaft (12) and arranged directly opposite from a commutator (36) and/or a position transmitter (62, 64) of the armature shaft (12), and the plastic body (95) features in particular a formation (107) for adapting to the motor geometry.

20. Electronic module (70) in a sandwich construction, comprising a first electrically conductive substrate (71) and a second electric conductive substrate (72), between which power components (75) are located and electrically connected to both substrates (71, 72), and a side (84) of the second substrate (72) facing away from the first substrate (71) is equipped with additional electronic components (56), wherein the first substrate (71) is embodied as a punched grid (44), which together with the second substrate (72) is extrusion coated with a plastic body (95), in such a way that the extensions (97) of the punched grid (44) protrude from the plastic body (95), forming an electrical and/or mechanical interface (98) for connecting additional motor components (99, 38, 40, 104, 102, 80).

21. Method to produce an electric motor (10) with an electronic control unit (70), characterized by the following steps:

a one-piece conductive punched grid (71, 44) is punched out, wherein a dam bar (93) connects the individual segments (73) with one another;

pre-soldered power components (75) on the punched grid (44) and above it a ceramic substrate (72, 81) with additional components (56) are coated into a sandwich;

the individual layers (71, 75, 72) are electrically connected with one another by means of joining methods, for example soldering or adhesion;

using a transfer molding process, a module body (95) of plastic is sprayed on around the sandwich (70) in such way that the dam bar (93) is arranged outside the module body (95); and

the dam bar (93) is separated and the extensions (97) of the punched grid (44) that protrude from the module body (95) are mechanically connected to motor components (99), such as carbon brushes (38) or electro-magnetic shielding elements (104) or connecting means (102), or to external electrical components (74).

22. Method according to Claim 21, characterized in that a magnetic position sensor (60) is arranged on the ceramic substrate (72) and extrusion coated with plastic (95) in such a way that, after assembly of the control unit (70), the position sensor (60) is arranged directly opposite from a magnetic position transmitter (62, 64) arranged on a armature shaft (12) of the electric motor (10) and cooperates with said position transmitter.